as water-partings indicated by black lines, should never be used in the schoolroom.

The young German does not leave his geography behind when he leaves the primary school. Far from it, as, in the gymnasia and *realschulen*, geography is taught for two hours a week throughout the whole course, except that, in some gymnasia (classical schools), the last two years are devoted to other subjects. What is actually taught may be gathered from the following summary of the programme of the *realschule* of the first order at Leipzig : —

Sexta (lowest class). — Leading principles of physical geography, general view of the earth, geography of Saxony, exercises in map reading and drawing.
Quinta. — Advanced instruction in the above branches, Germany taking the place of Saxony as the special subject.
Quarta. — Revision of the work of the two previous years, extra-European continents.
Tertia. — Germany, both physical and political, map-drawing.
Unter secunda. — Foreign European countries and their colonies.
Ober secunda. — Extra European continents, especially as to their physical conditions.
Unter prima. — Astronomical geography.
Ober prima. — Revision of the whole field, astronomical geography.

As to methods, Mr. Keltie was impressed by the fact that the teaching of geography was a much more lively operation on the continent than in England. In Germany the teacher counts for a great deal; the text-book, for very little. There is almost no lesson-hearing; the text-book, when used, simply furnishing a text for the teacher's explanations. No attempt is made to crowd the lessons with minute details—no long lists of names; no tables of statistics, of population of cities, lengths of rivers, or heights of mountains. The memorizing is confined to the leading principles, facts, and features. In fine, when a German boy leaves the higher school for business or the university, he carries with him a sound working knowledge of geography.

Of course, there could not be such good teaching without good teachers ; and it is a fact to be noted, that, at the present moment, the leading universities of Germany set out to train teachers of geography exactly as they do teachers of history, archeology, or botany. A dozen years ago this was not so, as nearly all the twelve professorships of geography have been founded since 1873. Now, however, geography is on an equal footing with other branches in more than half of the German universities. At Goettingen, for example, a man may take his doctorate, with geography as his special subject. Then, too, there are examinations for the right of teaching (*facultas docendi*) geography in the higher schools. These examinations are of two degrees or stages: 1°, for the right to teach in the lower classes ; and, 2°, for the right to give instruction to the highest classes. The course for this last examination extends over two years. The candidate must attend a systematic series of lectures on the facts and principles of geography. At the *übungen*, or exercises for advanced students, practice in the best methods of teaching is afforded. Special investigations are encouraged by some professors, as, for instance, by Rein at Bonn, and Richthofen at Leipzig. Mr. Keltie 'assisted' at one of these practice-courses, and was evidently surprised at the excellence of the work presented. There is no doubt, that, as the supply of well-trained teachers becomes more ample, the teaching of geography will be still further improved. What has already been accomplished is well set forth in the following sentence from the recent 'memorial' of the Royal geographical society : —

"An impartial comparison of the literary results of English and German travel at the present day seems to show that the educational advantages which we ask for in England, and which are attainable in Germany, have there borne their actual fruit in developing and directing the powers of observation in German travellers."

METEOROLOGICAL CONFERENCE.

On invitation of the chief signal officer, U. S. army, representatives of a number of the state weather services met in Washington on Feb. 23 and 24, to consider the relation of state services to the signal service, matters of observation, display of local weather-signals, and related topics. The meeting was opened by General Hazen, chief signal officer. Prof. T. C. Mendenhall of the signal office was then chosen chairman, and Prof. W. M. Davis was appointed secretary. Four sessions were held in the lecture-room of the national museum, and the following action was taken.

The conference recommends that the volunteer observers of the state weather services should make their regular thermometric observations at 7 A.M., 2 and 9 P.M. When maximum and minimum thermometers are used, they should be read at the latest hour of observation in the day, preferably at 9 P.M. Observers of rainfall are advised to use the new form of rain-gauge adopted by the signal service, or to follow this pattern as nearly as possible. The gauge should, when practicable, be placed with the collecting-edge one foot above the ground, and should stand at least twice as far from adjacent objects, such as trees, buildings, fences, etc., as the height of these objects. The conference disapproves of placing rain-gauges on the roofs of buildings.

Committees were appointed as follows: Messrs. Dunwoody, Mell, and Upton, to prepare forms for records to be used by state services and volunteer observers; Messrs. Davis, Thomas, Mell, Dunwoody, and Woodruff, to report on a system of weather-signals for local display throughout the country; Messrs. Mendenhall, Fuertes, Dunwoody, Upton, and Payne, to consider plans for a permanent organization of the conference.

The attendance at the conference represented so many parts of the country, that its recommendations will doubtless have due weight in securing the desirable end of uniform methods of work in the state services now in operation, and in those yet to be formed. Among the members of the signal service, there were present Professor Mendenhall, Lieutenants Dunwoody, Woodruff, Finley, Walshe, and Day, Professors Ferrel, Abbe, Hazen, Russell, and Marvin, and Mr. McAdie. The state services were represented by Professor Thomas of Ohio, Professor Payne of Minnesota, Professor Young of Nevada, Professor Mell of Alabama, Messrs. Henderson and Redding of the bureau of agriculture, Georgia, Professors Upton and Davis and Messrs. Rotch and Ellsworth of New England, and Professor Huston of Indiana. Professor Fuertes of Cornell university, and Mr. Gillingham of Virginia, volunteer observers of the signal service, were also present.

The conference adjourned, to meet again at the call of the committee on permanent organization.

At the meeting of the committee on permanent organization, held after the adjournment of the conference, it was decided to organize under the name of the 'Association of local weather services,' and to hold meetings annually in February. The object of the association is to encourage and promote the mutual co-operation of the local weather services and the general weather service of the United States. Its membership is limited to the officers of local services or duly appointed delegates, together with representatives from the chief offices.

METHOD OF STATING RESULTS OF WATER-ANALYSES.

THE Chemical society of Washington, at the meeting of Nov. 12, 1885, appointed a committee to consider the present state of water-analyses, and to present a method of stating analyses adapted for general use, in order that those hereafter published may be readily compared with each other and with future work. This committee reported Feb. 11, 1886, and was authorized to prepare an abstract for publication, in order to call the attention of chemists to the subject.

The society earnestly recommends the adoption of the scheme which is herewith briefly presented. The full text of the report will be published in the next bulletin of the society.

Water-analyses are usually made to answer one of three questions: viz., 1°, Is the water useful medicinally? 2°, Is it injurious to health? and, 3°, Is it suitable for manufacturing purposes? Many books relating to water were published during the eighteenth century, but accurate chemical analysis was not attempted until about 1820. As the earlier analyses were isolated, rare, and made for special purposes, the form of the statement was of little importance, if it was only intelligible. At the present time, however, water-analyses are very numerous. An examination of about a thousand shows some forty-two methods of stating quantitative results, there being sometimes three different ratios in the report of one analysis. Such discrepancies render comparisons difficult and laborious.

The various methods of statement may be classified under the following general forms:—

1°. Grains per imperial gallon of 10 pounds, or 70,000 grains.

2°. Grains per U. S. or wine gallon of 58.372+ grains.

3°. Decimally, as parts per 100, 1,000, 100,000, or 1,000,000.

4°. As so many grams or milligrams per litre.

The last two would be identical if all waters had the same density; but as the densities of sea-water, mineral waters, etc., are much above that of pure water, it is plain that the third and fourth modes are not comparable.

The committee therefore unanimously recommends —

1°. That water-analyses be uniformly reported, according to the decimal system, in parts per million, or milligrams per kilogram, with the temperature stated, and that Clark's scale of degrees of hardness, and all other systems, be abandoned.

2°. That all analyses be stated in terms of the radicals found.

3°. That the constituent radicals be arranged in the order of the usual electro-chemical series, the positive radicals first.

4°. That the combination deemed most probable by the chemist should be stated in symbols as well as by name.

The abandonment of Clark's scale has been recommended by Wanklyn and Chapman; and the recommendation made by the committee does not involve the disuse of his method, but merely the bringing of it into accord with the decimal system, — the changing from grains per gallon to milligrams per kilogram.